

299-W23-17 (A7886) Log Data Report

Borehole Information:

Borehole: 299-W23-17 (A7886)		Site: 216-U-10 Pond			
Coordinates (WA State Plane)		GWL (ft)¹: 219.74	GWL Date: 10/9/2002		
North	East	Drill Date	TOC² Elevation	Total Depth (ft)	Type
134,630.76 m	566,532.11 m	June 1993	204.14 m	228	Cable Tool

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
stainless steel	3.0	6 5/8	6 3/8	1/8	+3	n/a ³
304 schedule-5 stainless steel	0.9	4 1/2	4 1/4	1/8	+0.9	197.3
304 schedule-5 stainless-steel screen		4 1/2	4 1/4	0.055	197.3	227.4
The logging engineer measured the casing stick up using a steel tape. Measurements were rounded to the nearest 1/32 in. Casing thickness was calculated. The 4-in. casing at the ground surface cannot be measured because the 6-in. casing is too high. Casing thickness was calculated.						

Borehole Notes:

Borehole coordinates, elevation, and well construction information, as shown in the above tables, are from measurements by Stoller field personnel, HWIS⁴, and Chamness and Merz (1993). Duratek Federal Services measured depth to water and depth to bottom when they removed the borehole pump and tubing. Zero reference is the top of the 6-in. casing. Top of casing is a precise factory-cut. A reference point survey "X" is located on top of the casing stickup.

According to HWIS, the well was constructed by drilling a 17-in. nominal hole to 20 ft, a 13-in. nominal hole to 149 ft, and a 9-in. nominal hole to 233 ft. T304 stainless-steel 4-in. screen was used in this borehole, and an estimate of its thickness was obtained from John Auten, drilling engineer with CH2M Hill Hanford, Inc. The 6-in. casing appears to only be surface casing. Cement grout extends to 14 ft. The annulus around the 4-in. casing was sealed with bentonite crumbles and pellets from 14 to 192.3 ft. Below the bentonite seal, there is a silica sand pack surrounding the 4-in. stainless steel screen to total depth (HWIS).

Logging Equipment Information:

Logging System:	Gamma 2B	Type:	SGLS (35%)
Calibration Date:	09/2002	Calibration Reference:	GJO-2002-384-TAC
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Logging System:	Gamma 2A	Type:	SGLS (35%)
Calibration Date:	10/2002	Calibration Reference:	GJO-2002-383-TAC
	Logging Procedure: MAC-HGLP 1.6.5, Rev. 0		

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3	4	5/Repeat
Date	10/17/02	10/29/02	10/30/02	10/31/02	10/31/02
Logging Engineer	Spatz	Spatz	Spatz	Spatz	Spatz
Start Depth (ft)	41.0	126.0	228.0	166.0	124.0
Finish Depth (ft)	3.0	40.0	165.0	125.0	101.0
Count Time (sec)	200	200	200	200	200
Live/Real	R	R	R	R	R
Shield (Y/N)	N	N	N	N	N
MSA Interval (ft)	1.0	1.0	1.0	1.0	1.0
ft/min	N/A ⁵	N/A	N/A	N/A	N/A
Pre-Verification	BB154CAB	BA165CAB	BA166CAB	BA167CAB	BA167CAB
Start File	BB154000	BA165000	BA166000	BA167000	BA167042
Finish File	BB154038	BA165086	BA166063	BA167041	BA167065
Post-Verification	BB154CAA	BA165CAA	BA166CAA	BA167CAA	BA167CAA
Depth Return Error (in.)	0	-1	+1	N/A	0
Comments	Fine-gain adjustments.	Fine-gain adjustments.	No fine-gain adjustments.	Fine-gain adjustments.	Repeat section. No fine-gain adjustment.

Logging Operation Notes:

Zero reference was the top of the 6-in. casing. Logging was performed without a centralizer installed on the sonde. Pre- and post-survey verification measurements for the SGLS employed the Amersham KUT (⁴⁰K, ²³⁸U, and ²³²Th) verifier with serial number 082. On 10/17/02, pre-run verification file BB154CAB was not saved. Starting on 10/29/02, sonde A replaced sonde B on the logging system, and a new logging cable was installed.

Analysis Notes:

Analyst:	Sobczyk	Date:	11/20/02	Reference:	GJO-HGLP 1.6.3, Rev. 0
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SGLS pre-run and post-run verification spectra were collected at the beginning and end of each day. The verification spectra were all within the control limits except for BA166CAB. File BA166CAB (logging run 3) was slightly below the control limit for the 609-keV peak counts per second (cps) value; however, the post-run verification file (BA166CAA) was within the control limits. Examination of spectra indicates that the detector appears to have functioned normally during logging run 3, and the spectra are provisionally accepted, subject to further review and analysis. The peak counts per second at the 609-keV, 1461-keV, and 2615-keV photopeaks on the post-run verification spectra as compared to the pre-run verification spectra for each day were between 1 and 8 percent of one another.

Log spectra for the SGLS were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Verification spectra were used to determine the energy and resolution calibration for processing the data using APTEC SUPERVISOR. Concentrations were calculated in EXCEL (source files: G2BSep02.xls and G2AOct02.xls), using parameters determined from analysis of recent calibration data. Zero reference was the top of the 6-in. casing. The casing configuration was assumed to be one string of 6-in. surface casing to a log depth of 14 ft, a string of 4-in. casing to a log depth of 197.3 ft, and a screen from 197.3 ft to total depth. Casing correction factors were calculated

assuming a total casing thickness of 0.25 in. from 0 to 14 ft, 0.125 in. from 14 to 197.3 ft, and 0.055 in. below 197.3 ft. These casing thicknesses are based upon field measurements. Where more than one casing exists at a depth, the casing correction is additive (e.g., $0.125 + 0.125 = 0.25$ would be the combined thickness for the 6-in. and 4-in. casings). A water correction was applied to the SGLS data below 219.7 ft. Dead time corrections are required when dead time exceeds 10.5 percent. A dead time correction was not applied because the dead time did not exceed 10.5 percent.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (^{40}K , ^{238}U , and ^{232}Th), and man-made radionuclides. Plots of the repeat logs versus the original logs are included. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. These errors are discussed in the calibration report. A combination plot is also included to facilitate correlation. The ^{214}Bi peak at 609 keV was used to determine the naturally occurring ^{238}U concentrations on the combination plot rather than the ^{214}Bi peak at 1764 keV because it exhibited slightly higher net counts per second.

Results and Interpretations:

^{137}Cs was the only man-made radionuclide detected in this borehole. ^{137}Cs was detected at 68 and 143 ft with a concentration of 0.2 pCi/g, which is near its MDL.

Recognizable changes occur in the KUT and total gamma logs. The decreases in the KUT logs at 194 ft are attributed to the end of the bentonite seal and entry into a zone where the annular space is filled with a silica sand pack. It is likely that gamma emissions from undisturbed sediments are only marginally detected by the SGLS. Above 206.5 ft, the KUT response appears to primarily be from the annular bentonite seal.

Due to the method of well completion, SGLS results in this borehole probably do not reflect the distribution of the natural or man-made radionuclides in the formation. The presence of a relatively wide annulus filled with bentonite and/or sandpack around the casing greatly attenuates gamma rays originating in the surrounding formation. Results from this borehole do not reflect actual concentrations in the formation and should be used with caution. It is recommended that other RCRA wells with similar configuration (large annular space filled with grout and/or bentonite, sandpack) should be evaluated for suitability for logging on a case-by-case basis.

The plots of the repeat logs demonstrate reasonable repeatability of the SGLS data for the natural radionuclides (609, 1461, 1764, and 2614 keV).

References:

Chamness, M.A. and J.K. Merz, 1993. *Hanford Wells*, PNL-8800, Pacific Northwest Laboratory, Richland, Washington.

¹ GWL – groundwater level

² TOC – top of casing

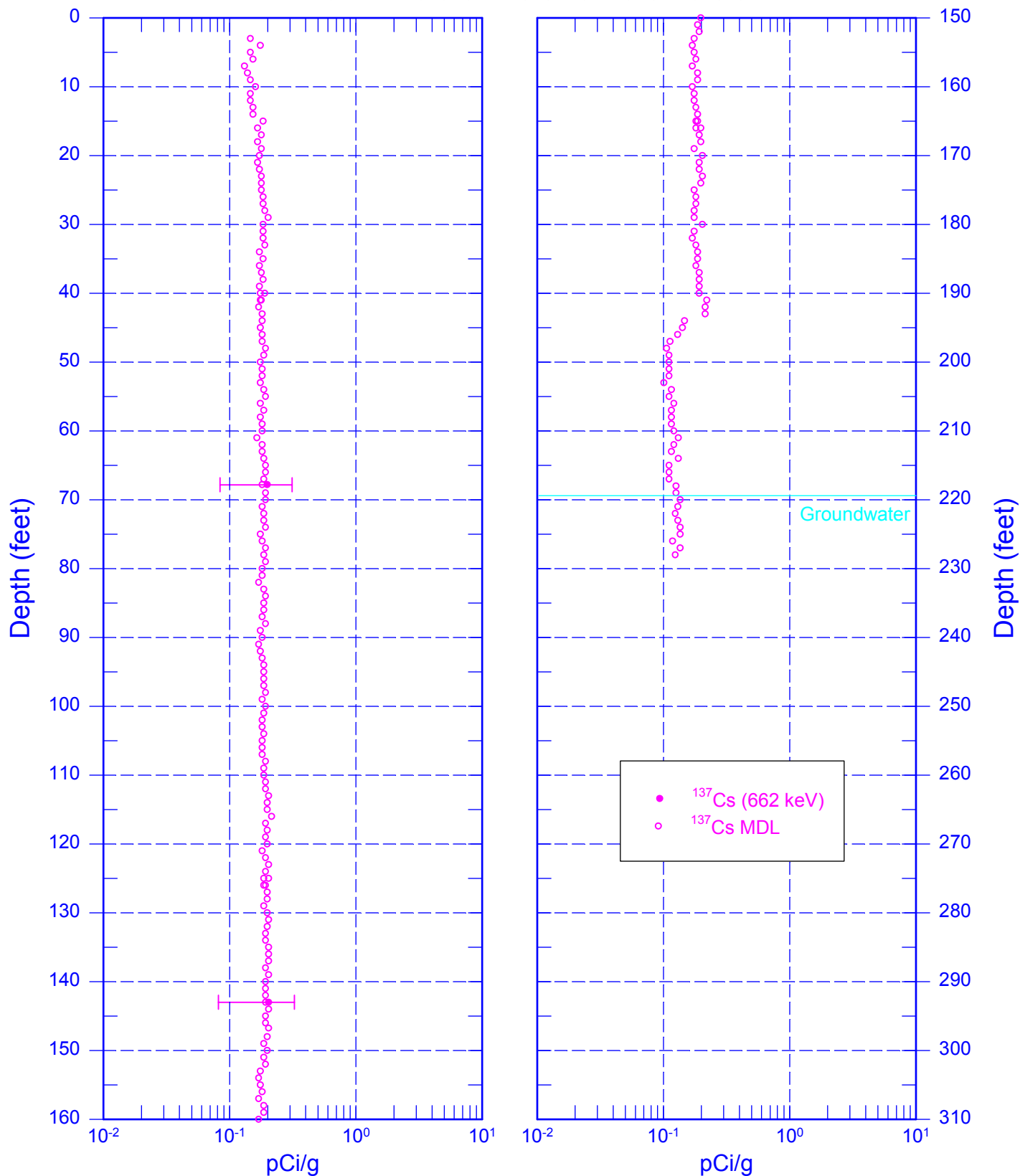
³ n/a – not available

⁴ HWIS – Hanford Well Information System

⁵ N/A – not applicable

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Man-Made Radionuclides

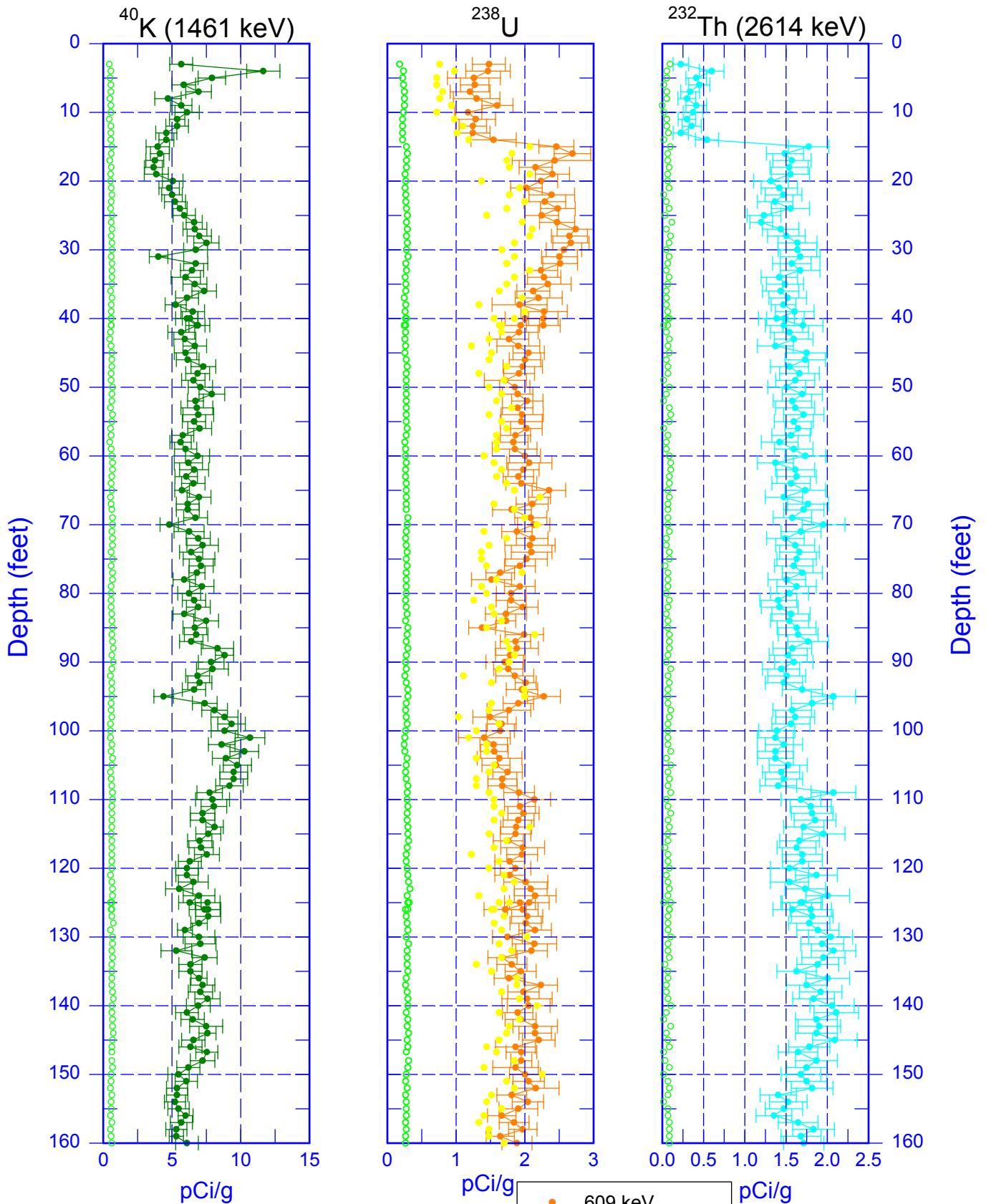


Zero Reference = Top of Casing

Date of Last Logging Run
10/31/2002

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Natural Gamma Logs

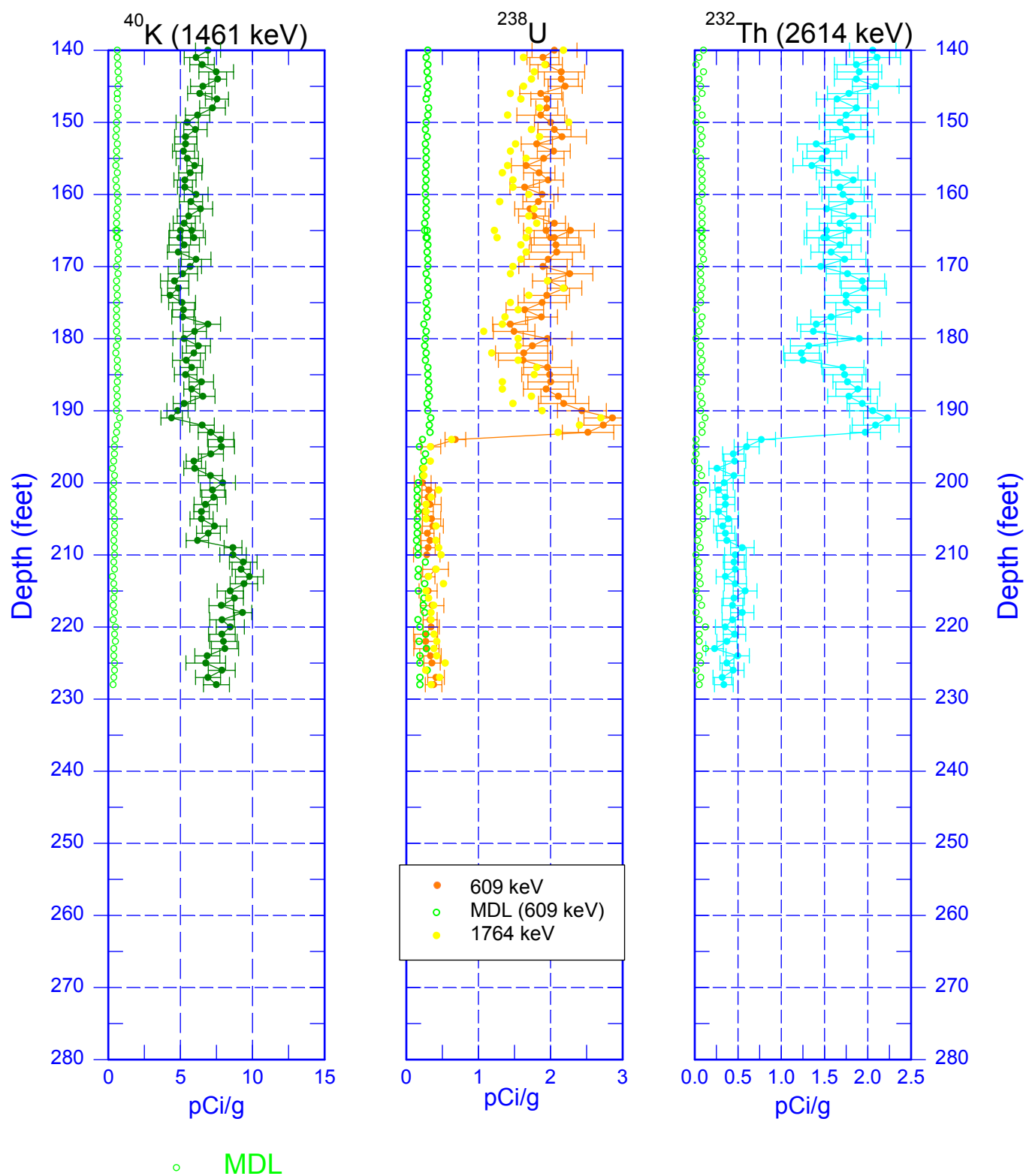


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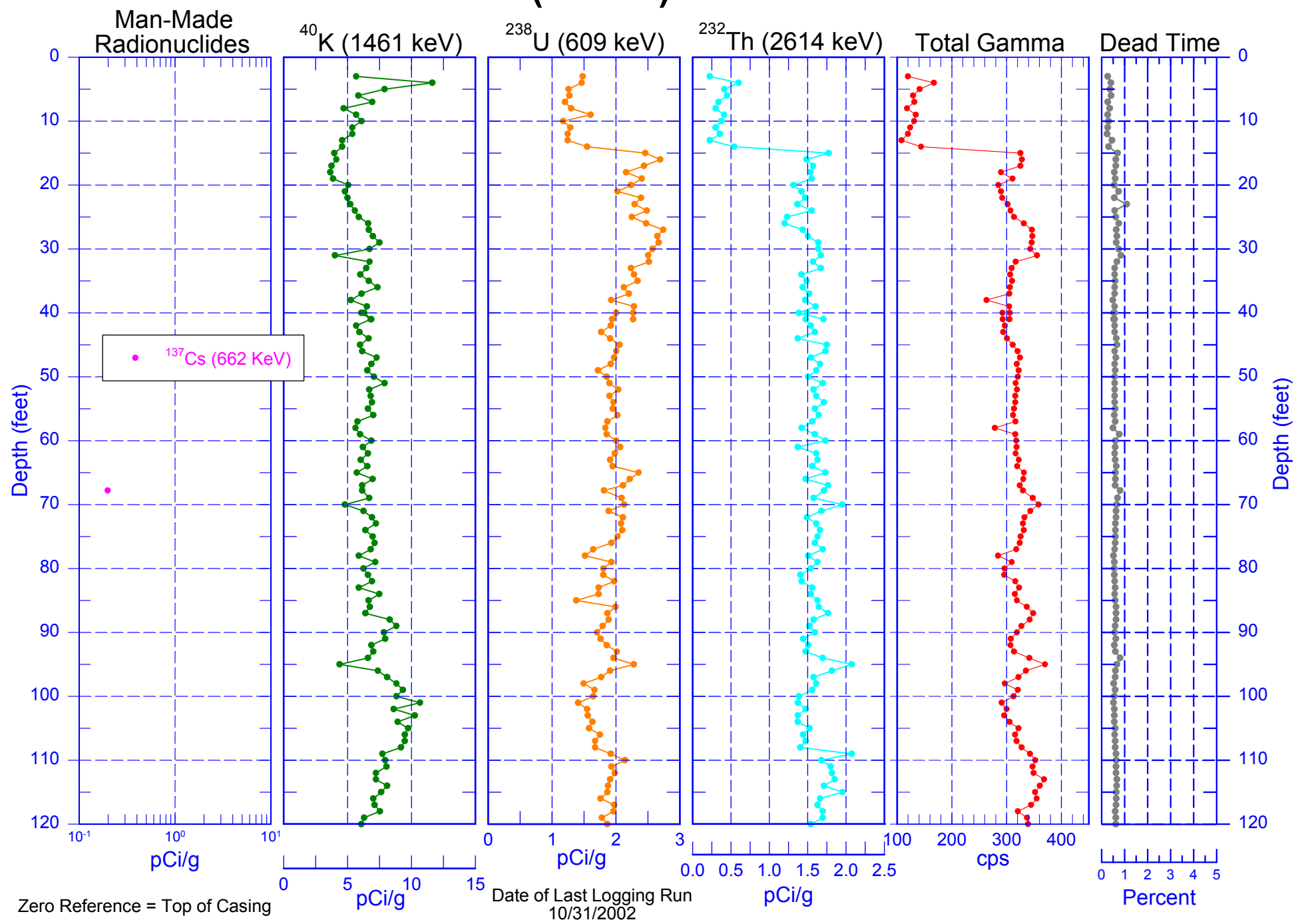
Natural Gamma Logs



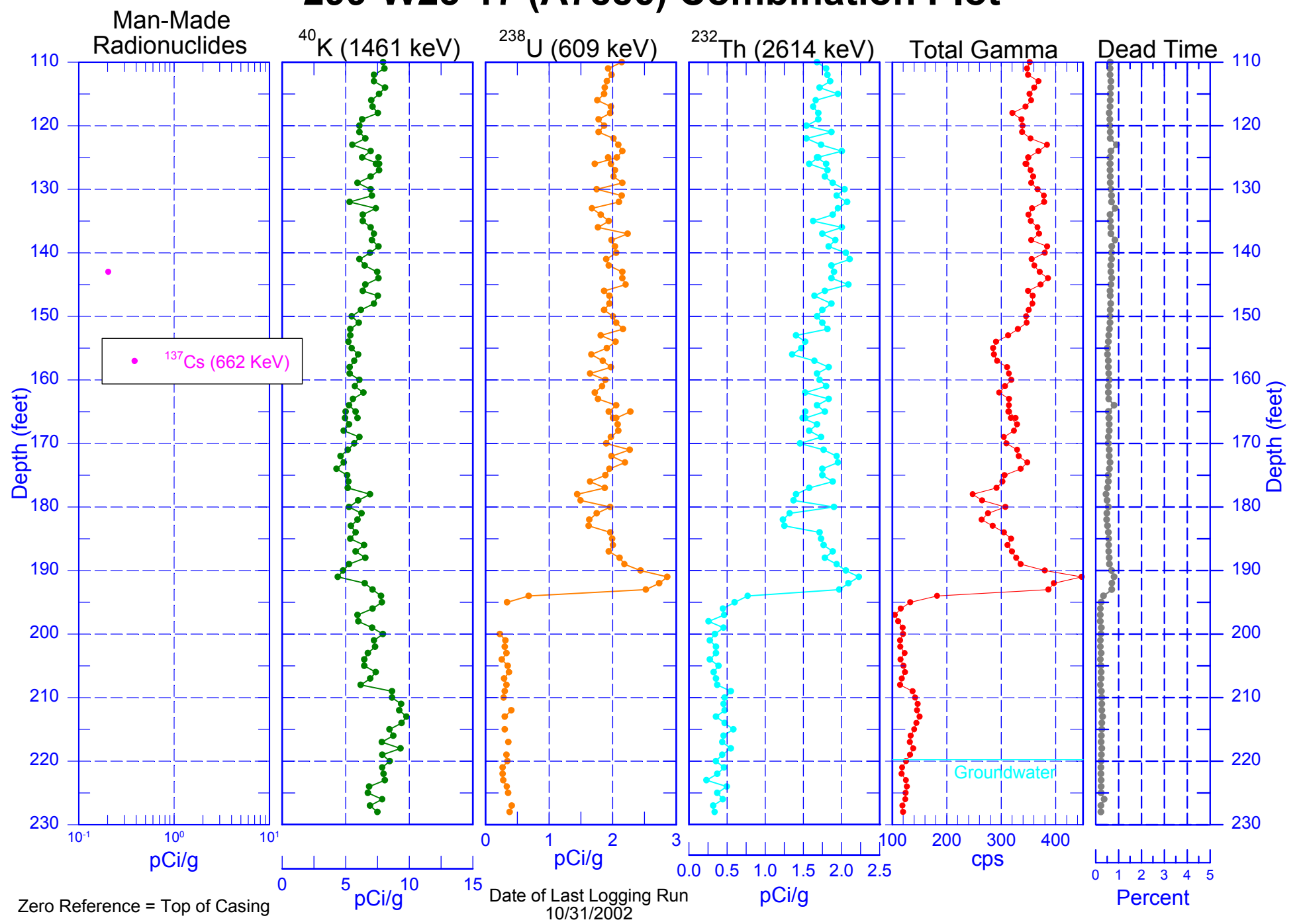
Zero Reference = Top of Casing

Date of Last Logging Run
10/31/2002

299-W23-17 (A7886) Combination Plot

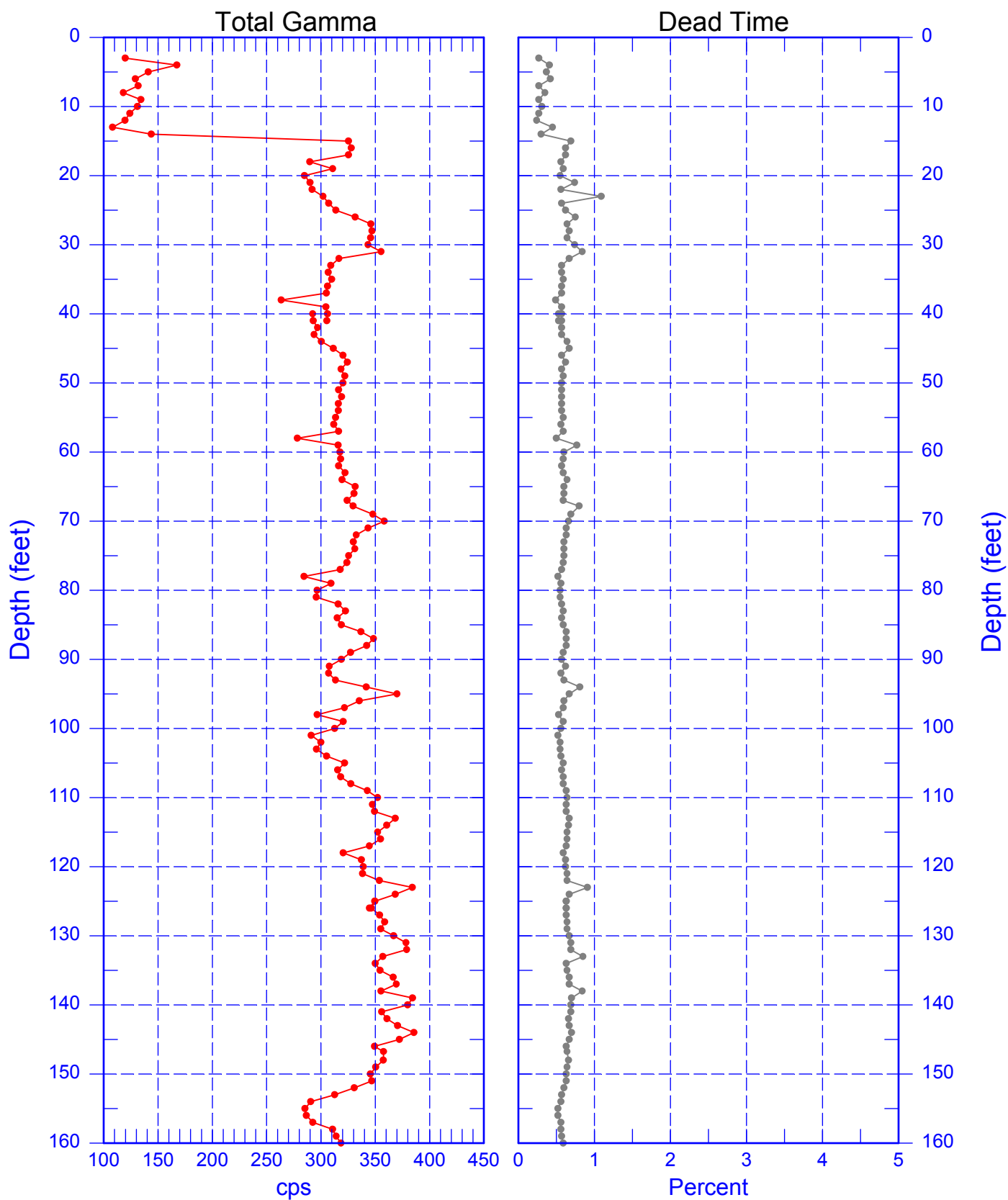


299-W23-17 (A7886) Combination Plot



299-W23-17 (A7886)

Total Gamma & Dead Time

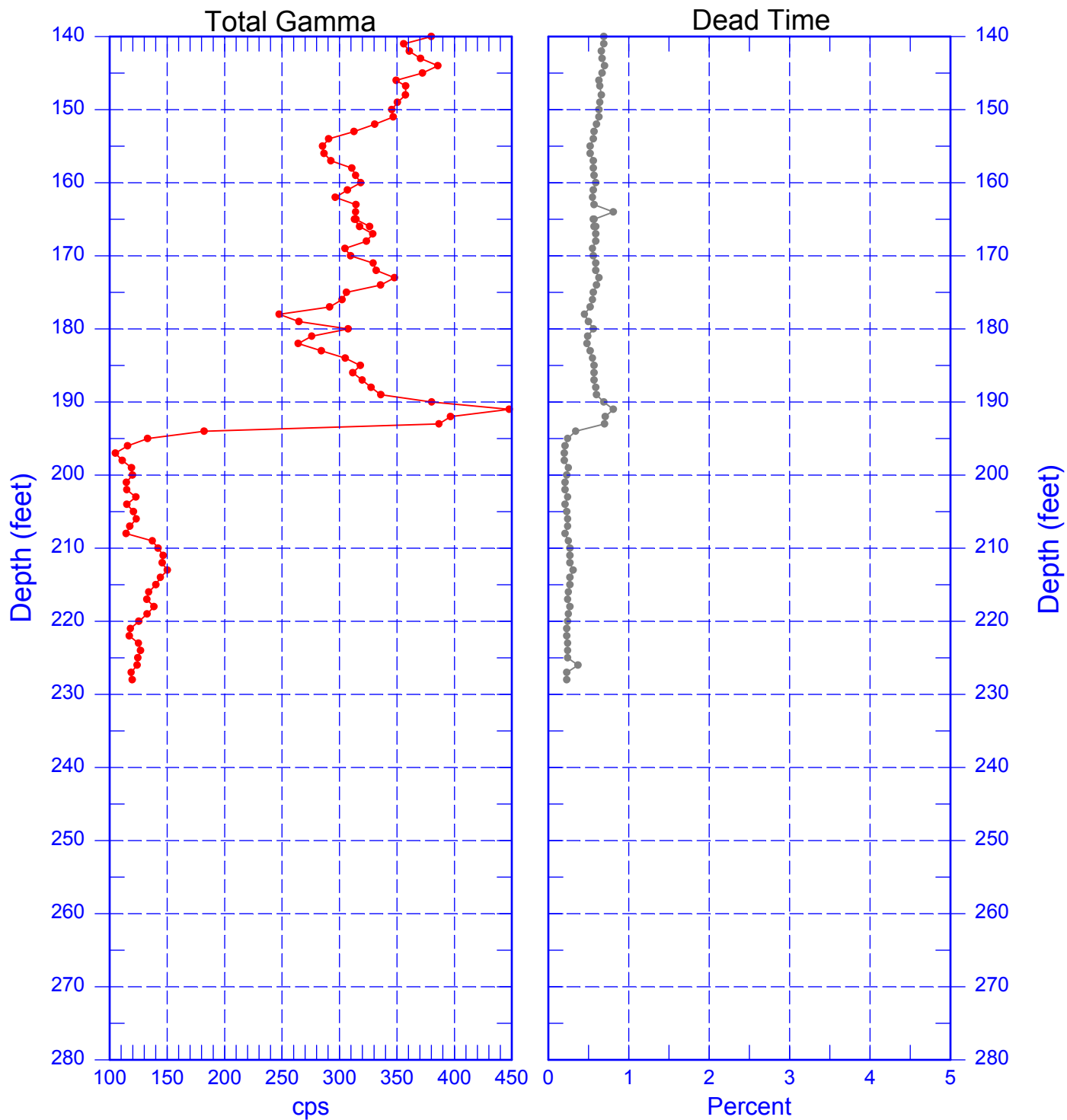


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10/31/2002

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Total Gamma & Dead Time



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10/31/2002

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Rerun of Natural Gamma Logs (124.0 to 101.0 ft)

